

SUSPENSION DEVICE FOR  
THERMOPLASTIC CONTAINERS

Cross-Reference To Related Application

5     [001] This application is based on and claims priority from provisional patent  
Application Number 60/429,765 filed on November 27, 2002.

Technical Field

10    [002] The present invention relates to thermoplastic containers, and more particularly to  
a device for suspending thermoplastic containers.

Background of the Invention

15    [003] The use of containers for the storage of items is well known. Such containers are  
used to store a variety of articles, from food to general household items including  
everything from craft supplies to children's toys. Generally, such containers can be  
characterized by shape, size, and the presence or absence of a lid. Containers that do not  
include a lid require a separate sealing member, such as a plastic wrap or aluminum foil.  
Often, the plastic wrap or aluminum foil is loose or jostled during movement of the  
container, and hence, the container is usually not properly sealed or closed to prevent  
20    contents therein from spilling. Containers that include lids overcome this problem.

25    [004] In addition to the foregoing, many different types and sizes of containers exist.  
When such containers are placed together in a confined space, such as a cupboard, cabinet,  
drawer, shelf, refrigerator, or the like, a disorganized condition can develop, preventing a  
user from easily locating a particular container. Further, as a user is attempting to locate a  
particular container, the container may be jostled, thereby causing one or more containers  
to fall off a supporting surface to the floor, resulting in breakage of the container and/or  
the articles stored therein and/or spilling of contents. Also, the containers are usually  
placed on top of one another, leading to an inefficient use of space. Still further, when  
containers are stacked on top of each other in an unconfined location, the containers tend  
30    to slide out of the stacked configuration and into a disorganized state.

[005] Carroll, U.S. Patent No. 4,241,668 discloses a frame for mounting a container and a cover below a supply shelf. The frame is suspended from spaced apart rails depending from the supply shelf by multiple hooks. The frame includes side beams with inwardly extending flanges for engaging the container and cover and allowing the container and lid to be inserted and removed from the frame.

[006] Bross U.S. Patent No. 4,632,472 discloses a slidable drawer system mounted below a shelf. Guide rails are mounted to the shelf and receive flanges of the drawer, wherein the drawer slides in and out of the guide rails. A finger is attached to each guide rail wherein the fingers contact the rear wall of the drawer to prevent removal of the drawer from the guide rails in a first direction. To completely disengage the drawer from the guide rails the fingers must be pushed upwardly away from the rear wall to disengage the drawer from the guide rails. A front portion of the drawer includes extending side walls that contact the guide rails as the drawer is being pushed inwardly, thus preventing the drawer from sliding out of the housing in a second direction.

[007] DeBruyn U.S. Patent No. 4,653,818 discloses a dry food storage container system wherein containers are supported by hanger plates that form a rack and are adapted to slide in and out of a cabinet. An upwardly projecting lug formed on the hanger plate restricts free sliding movement of the container. The containers may be laterally removed from or laterally inserted into the hanger plates when the container is lifted slightly over the lugs.

[008] Marino Jr. U. S. Patent No. 5,964,359 discloses a modular storage system for multiple containers including a base having a top wall, a side wall, and a bottom wall wherein the bottom wall has a front opening cutout. A jar with cover may be inserted into the opening wherein the cover rests on the bottom wall and suspends the jar with contents therefrom.

[009] Semon et al. U.S. Patent No. 6,056,378 discloses an add-on drawer and a method of mounting the same to a horizontal surface. The drawer includes a tray for storing items and at least two rails for slidably supporting the drawer. Each rail includes stops to prevent removal of the drawer from below the horizontal surface.

### Summary of the Invention

[0010] In accordance with one aspect of the present invention, a suspension device includes a main member and a support member extending from the main member and having a first interference fit with a container. The suspension device further includes a wall member extending from the support member and having a second interference fit with the container. The first interference fit is capable of resisting relative movement of the suspension device and the container in a first direction and the second interference fit is capable of resisting relative movement of the suspension device and container in a second direction transverse to the first direction. Further, the suspension device is capable of exerting a non-zero variable resistance force on the container.

[0011] In accordance with another aspect of the present invention, a suspension device includes a main member, a first means extending from the main member and having a first interference fit, and a second means extending from the first means and having a second interference fit. The first interference fit is capable of resisting relative movement of the suspension device and the container in a first direction and the second interference fit is capable of resisting relative movement of the suspension device and container in a second direction transverse to the first direction. The suspension device further includes third means for establishing a resistance force that increases during insertion and removal of the container from the suspension device.

[0012] In accordance with still another aspect of the present invention, a combination includes a suspension device including a main member, a support member extending from the main member, and a wall member extending from the support member, the support member and the wall member defining a cavity bounded by first and second openings. The combination further includes a container wherein the support member and the wall member define interference fits with the container and wherein the container experiences a resistance force that increases during insertion and removal from the suspension device.

[0013] In accordance with yet another aspect of the present invention, a one-piece suspension device includes a main member, support members extending from the main member and having a first interference fit, and wall members extending from the support members and having a second interference fit. The first interference fit is capable of

resisting relative movement of an object contained therein in a first direction and the second interference fit is capable of resisting relative movement of the object contained therein in a second direction transverse to the first direction. The suspension device further includes an opening defined by the main member, the support members, and the wall members, wherein the wall members defining the opening include interference members to retain the object contained therein.

**[0014]** In accordance with another aspect of the present invention, a suspension device includes a main member, support members extending from the main member and having a first interference fit, and wall members extending from the support members and having a second interference fit, wherein the main member, support members, and wall members are formed integrally. The first interference fit is capable of resisting relative movement of an object contained therein in a first direction and the second interference fit is capable of resisting relative movement of the object contained therein in a second direction transverse to the first direction. The suspension device further includes an opening defined by the main member, the support members, and the wall members, wherein the wall members defining the opening include interference members to retain the object contained therein.

**[0015]** In accordance with a further aspect of the present invention, a combination includes a suspension device having a main member, support members extending from the main member, and wall members extending from the support members, wherein the support members and wall members define a cavity. The main member, the support members, and the wall members are formed integrally. The combination further includes a container wherein the support members and wall members define interference fits with the container.

**[0016]** In accordance with another aspect of the present invention, a method of suspending an object comprises the steps of providing a suspension device, attaching the suspension device to a surface, and inserting an object into the suspension device to hang the object therefrom. The suspension device is capable of exerting a non-zero variable resistance force on the object during insertion of the object.

[0017] In accordance with yet another aspect of the present invention, a method of suspending a container includes the step of providing a one-piece suspension device having a base member, at least one support member extending from the base member, and at least one wall member extending from the support member(s). The method further includes the steps of attaching the suspension device to a surface and inserting a container into the suspension device.

[0018] Other aspects and advantages of the present invention will become apparent upon consideration of the following detailed description.

#### Brief Description of the Drawings

[0019] FIG. 1 is an isometric top view of a first embodiment of the suspension device of the present invention;

[0020] FIG. 2 is an isometric bottom view of the suspension device of FIG. 1;

[0021] FIG. 3 is a plan view of the suspension device of FIG. 1;

[0022] FIG. 4 is a side elevational view of the suspension device of FIG. 1 attached to a cabinet shelf;

[0023] FIG. 5 is an isometric top view illustrating the insertion of a container into the suspension device of FIG. 1;

[0024] FIG. 6 is an isometric top view of a container in the suspension device of FIG. 1;

[0025] FIG. 7 is an isometric top view of a suspension device of FIG. 1 molded into a shelf;

[0026] FIG. 8 is an isometric top view of a second embodiment of the suspension device of the present invention;

[0027] FIG. 9 is an isometric bottom view of the suspension device of FIG. 8;

[0028] FIG. 10 is a plan view of the suspension device of FIG. 8;

[0029] FIG. 11 is an isometric top view illustrating the insertion of a container into the suspension device of FIG. 8;

[0030] FIG. 12 is an isometric top view of a container in the suspension device of FIG. 8;

[0031] FIG. 13 is an isometric top view of a third embodiment of the suspension device of the present invention;

[0032] FIG. 14 is an isometric bottom view of the suspension device of FIG. 13;

[0033] FIG. 15 is an isometric top view illustrating the insertion of a container into the suspension device of FIG. 13; and

[0034] FIG. 16 is an isometric top view of a container in the suspension device of FIG. 13.

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#### Description of the Preferred Embodiment

[0035] Referring now to FIGS. 1-3, a first embodiment of a suspension device 20 includes a horseshoe-shaped main member 22 and a downwardly directed support member 24 extending transversely with respect to the main member 22. The support member 24 includes a curved main portion 26 that conforms to and abuts an outer periphery 28 of the main member 22. The support member 24 further includes outwardly flared resilient end portions 30, 32 on each side 34, 36 of a first opening 38. An inwardly directed wall member 40 is carried by the support member 24 and is parallel to the main member 22. Preferably, (although not necessarily) the wall member 40, the support member 24, and the main member 22 are integral with one another.

[0036] The first opening 38 has a width W1 defined by a chord that defines the shortest distance between the end portions 30, 32. Preferably, (again, not necessarily) the width W1 may be slightly smaller than the overall diameter of a circular container 42 (as seen in FIGS. 5 and 6) to be supported by the suspension device 20. The container 42 may comprise a jar, bowl, glass, tub, basket, or like structure made of any material, such as thermoplastic, glass fiberboard, etc... The container 42 may or may not have a lid mounted thereon. An inner periphery 44 of the wall member 40 defines a second opening 46 having a width W2 that is also somewhat smaller than the overall diameter of the container 42. Further, the width W2 may be (although need not be) smaller than the width W1 of the first opening 38. The main member 22, the support member 24, and the wall member 40 form a cavity 48 for receiving a rim 50 of the circular container 42 (as seen in FIGS. 5 and 6).

[0037] As seen in FIG. 2, the main member 22 includes a plurality of mounting holes 52 spaced around the horseshoe-shaped main member 22. Specifically, in the illustrated embodiment, there are preferably three mounting holes 52a-52c evenly spaced around the

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main member 22. As seen in FIG. 4, fasteners 54 may be used to attach the suspension device 20 to a support surface 56, such as a shelf 58 of a cabinet 60 or any other suitable surface. The suspension device 20 is mounted by placing the suspension device 20 adjacent the support surface 56 and driving the fasteners 54 through the mounting holes 52a-52c into the support surface 56 to hold the suspension device 20 adjacent the support surface 56.

[0038] Optionally, as seen in FIG. 2, the suspension device 20 may include a plate member 57 that is an extension of the main member 22. The plate member 57 adds stiffness to the suspension device 20. When the plate member 57 is utilized, the mounting holes 52 may be omitted and double-sided adhesive tape 59 is preferably used to attach the plate member 57 to a surface.

[0039] Once the suspension device is mounted as seen in FIG. 4, a user inserts the rim 50 of the circular container 42, (and, optionally, a lid 64 with a tab 65 mounted thereon) through the first opening 38 as seen in FIG. 5, whereupon the rim 50 of the container 42 (and/or the lid 64 and/or tab 65) engage and move the resilient end portions 30, 32 outwardly. Eventually, the end portions 30, 32 are displaced outwardly to a sufficient degree that the force resisting the insertion of the container 42 into the suspension device 20 suddenly decreases and the container 42 moves into the suspension device 20 with a snap action and is retained therein by first and second interference fits. The first interference fit is established between the container rim 50 (and/or, possibly, the lid 64 and/or one tab 65) and the end portions 30, 32. Referring now to FIGS. 5 and 6, once the container rim 50 is moved beyond the first interference fit and is disposed in the cavity 48, the second interference fit is established between the container rim 50 and the wall member 40. The first interference fit prevents the container 42 from being removed from the suspension device 20 through the first opening 38 until sufficient removal force is exerted by a user to overcome the resisting force exerted by the end portions 30, 32 (as seen in FIG. 5). Further, the second interference fit prevents the container 42 from moving downwardly out of the suspension device 20 through the second opening 46.

[0040] The suspension device 20 can optionally be integrally formed with a shelf 66 of a refrigerator, cabinet, pantry, closet, etc... as seen in FIG. 7. If this is the case, the

mounting holes 52 may be omitted from the main member 22 because fasteners or other attachment means are not necessary. The main member 22 may also be dispensed with, inasmuch as the function thereof is provided by the shelf 66 itself.

5 [0041] With a few exceptions, the suspension device 120 of FIGS. 8-10 is identical to the suspension device 20 of FIGS. 1-3. The suspension device 120 includes a horseshoe-shaped main member 122 and downwardly directed support members 124a-124e extending transversely with respect to the main member 122. Although five support members 124a-124e are depicted in this embodiment, any number of support members 124 is possible. The support member 124c includes a curved main portion 126 that  
10 conforms to and abuts an outer periphery 128 of the main member 122. An inwardly directed wall member 140 is carried by the support members 124a-124e and is parallel to the main member 122. Preferably, (although not necessarily) the wall member 140, the support members 124a-124e, and the main member 22 are integral with one another.

15 [0042] A first opening 138 defined by end portions 170, 172 of the suspension device 120 has a width W3 defined by a chord that defines the shortest distance between the end portions 170, 172 and is slightly smaller than the overall diameter of a circular container 142 (FIGS. 12 and 13) to be supported by the suspension device 120.

20 [0043] All other elements of the suspension device 120 are identical to the suspension device 20 of FIGS. 1-3. The suspension device 120 can also be attached by fasteners to a surface or may be made integral with a shelf 58 as with the suspension device 20.

25 [0044] As seen in FIGS. 11 and 12, the manner in which the container 42 (and possibly a lid 64 with tab 65 mounted thereon) is inserted into the suspension device 120 is somewhat different from that of the suspension device 20. The circular container 42 is inserted through the first opening 138 whereupon the end portions 170, 172 engage a rim 50 (and possibly the lid 64) of the container 142 and move the rim 50 (and possibly the lid 64) inwardly with a sufficient degree of force to allow the rim 50 (and possibly the lid 64) of the container 42 to move past the end portions 170, 172 into the suspension device 120, wherein the container 42 is retained therein by first and second interference fits, which are defined above in relation to suspension device 20. During such inward movement of the

container 42, one or more of the support members 124 may flex to accommodate the container 42.

[0045] The suspension device 220 of FIGS. 13 and 14 includes a square-shaped main member 220 and downwardly directed support members 224a-224c extending transversely with respect to the main member 222. The suspension device 220 further includes inwardly directed wall members 240a-240c integral with and carried by the support members 224a-224c, respectively, wherein the wall members 240a-240c are parallel to the main member 222.

[0046] The suspension device 220 of FIGS. 13 and 14 further includes an opening 238 defined by the main member 222, the support members 224a-224c, and the wall members 240a-240c. The wall members 240a and 240c include interference members 246 adjacent the opening 238, wherein the interference members 246 prevent a square-shaped container 248 as seen in FIGS. 18 and 19, from slipping out of the suspension device 220 when inserted therein. It should be noted that a circular container of a proper size can also be used with the suspension device 220.

[0047] The main member 222 includes a plurality of mounting holes 52 spaced thereabout that accept fasteners (not shown) to mount the suspension device 220 to an undersurface or shelf of a cabinet, pantry, closet, etc...as in the embodiments discussed previously.

[0048] Optionally, as seen in FIG. 14 and similar to the embodiment of FIG. 2, the suspension device 220 may include a plate member 257 that is an extension of the main member 222. When the plate member 257 is provided, the mounting holes 52 may be omitted and double-sided adhesive tape 259 is preferably provided between a top surface 261 of the plate member 257 and a mounting surface.

[0049] The square-shaped container 248 is inserted into the suspension device as seen in FIG. 15 by inserting a rim 250 of the container (and, preferably a lid 264 disposed on the container 248) over the interference members 246. The container 248 is thereafter pushed towards the support member 224b until a front portion 272 of the rim 250 and a front portion 274 of the lid 264 slide past the interference members 246. At this point, the user releases the square-shaped container 248 and the container 248 rests on the wall members 240a-240c. The interfering relationship of the rim 250 (and/or possibly, the lid 264) with

the support member 100b and the interference members 106 in a first direction and interference of the rim 250 and/or lid 264 with the support members 224a-224c in a second direction prevent the container 248 from unintentionally moving out of the suspension device 220. FIG. 16 shows the square-shaped container 248 fully inserted into the suspension device 220. It should be noted that any suitably-shaped container may be used in the suspension device 220 of FIGS. 13 and 14.

[0050] The container 248 is removed from the suspension device 220 by lifting the container 248 upwardly, thereby raising the rim 250 and lid 264 (if used) above the interference members 246. The container 248 can then be moved outwardly to permit a user access to the contents therein.

[0051] As with the suspension devices 20, 120 with the horseshoe-shaped main member 22, 122, the suspension device 220 with the square-shaped main member 222 can optionally be integrally mounted to a shelf 58 as discussed above.

[0052] Any method for mounting the suspension device of the present invention to a surface including, but not limited to, those methods discussed herein can be utilized. As noted above, a user can drive any fastener such as a shank of a nail or screw through the mounting holes 52 into the surface to which the suspension device is to be attached. Additionally, any type of adhesive such as silicone adhesives, epoxy adhesives, and the like, or other fastening means, may be used to secure any suspension device to the surface. Alternatively, a double-sided adhesive tape may be attached to the main member 22, 122, or 222. Still further, a hook or multiple clips of any material may be adhered or otherwise joined to the main member either integrally or separately to hang from a support structure such as a rod or a wire rack.

[0053] All of the embodiments of the suspension device of the present invention are preferably made of a thermoplastic material. Alternatively, any of the suspension devices may be manufactured from any suitable rigid material such as plastic, glass, metal, wood, or any other similar materials. A preferable material will be rigid, inexpensive, and have the ability to be readily formed into a desired shape. Suitable plastic materials for any embodiment of the suspension device of the present invention include polypropylene, polyethylene, styrene, polystyrene, nylon, and a wide variety of other homopolymers and

5 copolymers. Any suitable molding technique can be employed to form the suspension devices of the present invention, including, but not limited to, injection molding and thermoforming. The suspension devices are preferably integrally made but can also be formed in multiple parts that are snapped or pressed together during manufacture and assembly.

10 [0054] The suspension device can further have any geometric shape corresponding to the shape of the container inserted therein. For example, the suspension device may have a triangular shape or a rectangular shape for triangular and rectangular shaped containers, respectively, although the device need not have a shape corresponding to the shape of the container.

#### Industrial Applicability

15 [0055] As should be evident, one may use a single or ganged multiple suspension devices that are secured to a vertical support surface, a horizontal support surface or a non-horizontal and non-vertical support surface in any configuration and/or orientation desired by the user so that the containers are maintained in a desired arrangement.

20 [0056] The suspension device allows a user to address a variety of home storage problems. First, the suspension device enables a user to store and organize containers to fully utilize available storage space. For example, in a refrigerator, cabinet, closet, pantry, or the like, the present invention allows a user to hang containers from the underside of a shelf, thus freeing up the shelf surface space for the storage of other items. This type of use also ensures that the containers are clearly in view and always in the same location, thus increasing the likelihood that any perishable food will be utilized before spoilage occurs.

25 [0057] Numerous modifications to the present invention will be apparent to those skilled in the art in view of the foregoing description. Accordingly, this description is to be construed as illustrative only and is presented for the purpose of enabling those skilled in the art to make and use the invention and to teach the best mode of carrying out the same. The exclusive rights to all modifications which come within the scope of the appended claims are reserved.

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